

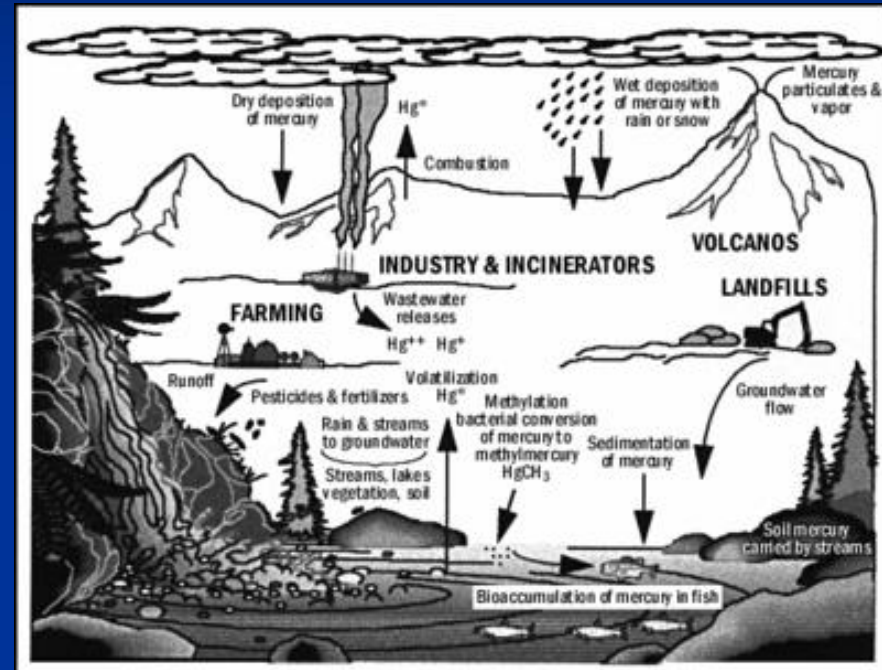
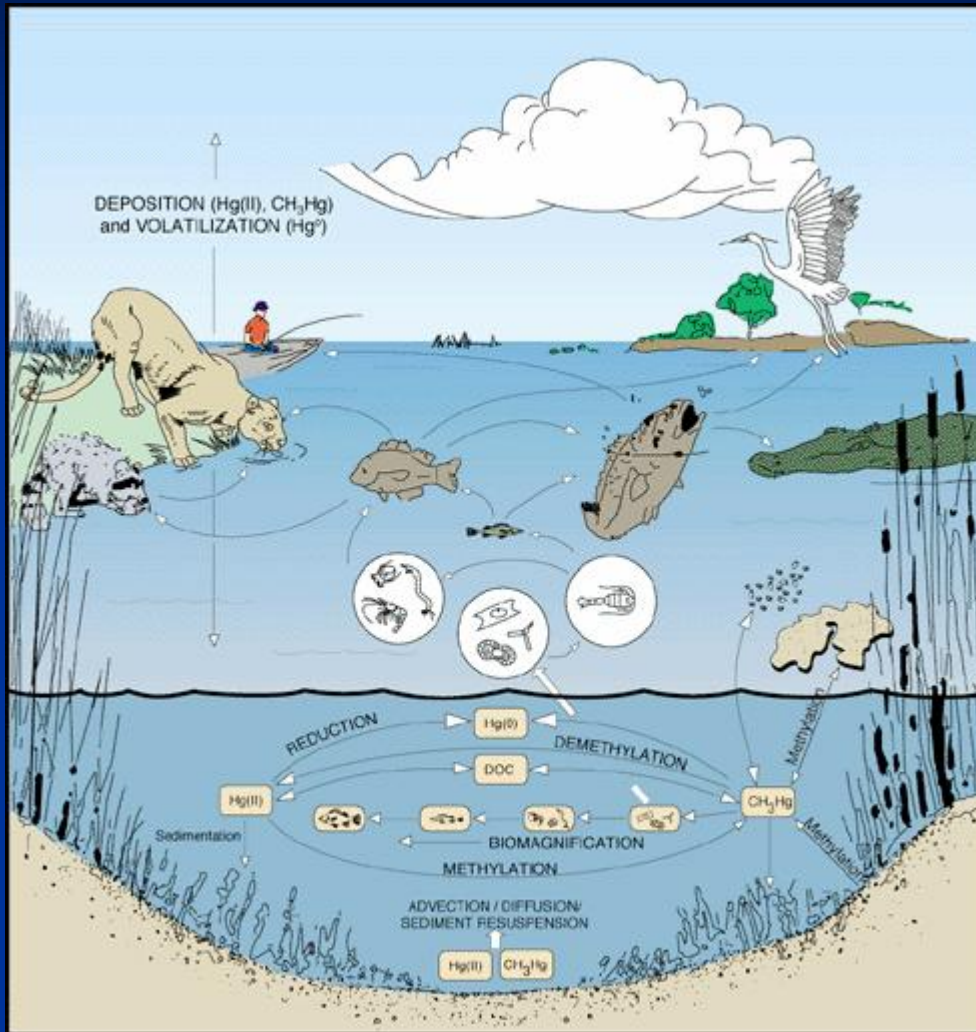
Mercury Cycling in Aquatic Ecosystems: Loading vs. Internal Processes



Amy Dickey

Utah DEQ, Division of Water Quality

The Mercury (Hg) Cycle



Toxic Effects of Hg to Humans

Methylmercury is the most toxic form of Hg

- Neurotoxin - damage to the brain and nervous system
- Impacts the immune system
- Alters genetic and enzyme systems
- Particularly damaging to developing embryos

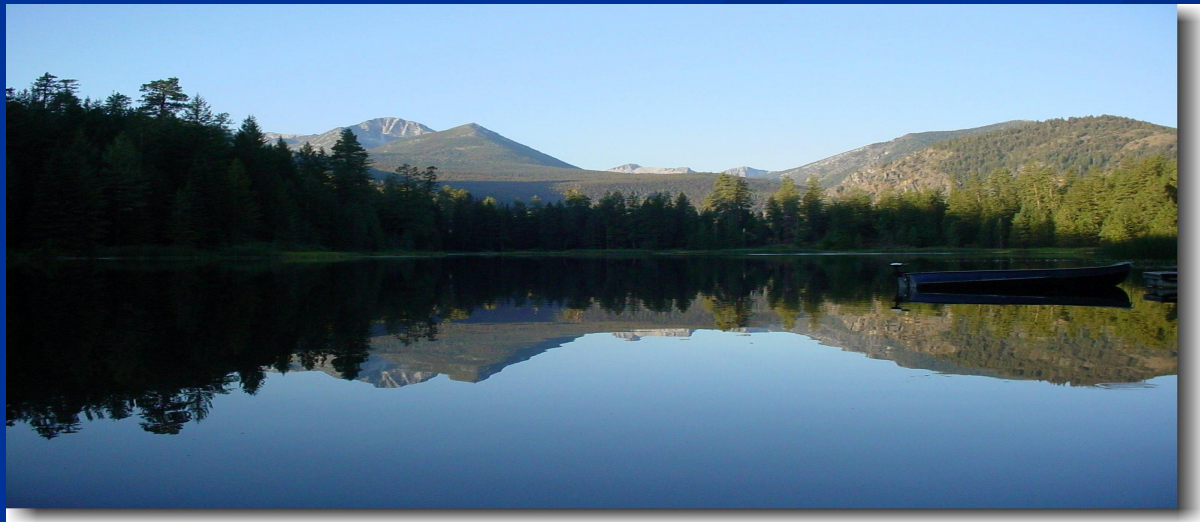
Something to consider...

- Most mercury monitoring has focused on loading (atmospheric, point source, lake and reservoir in flows)
- Are we missing an important part of the puzzle?



USGS Findings...

- Several studies show lakes with **minimal mercury loading** can have fish with **high mercury concentrations**



USGS Findings...

- On the other hand, they found many lakes with **significant mercury loading** to the water column...but fish with very **low mercury concentrations**



Why?

Are the internal lake processes just as critical or perhaps even more critical than the amount of mercury entering the system?

SRB Bacteria

Hg methylation

Bioaccumulation



Parameters that may indicate methylation potential

- Dissolved organic carbon: High concentrations appear to be correlated to increased mercury methylation
- Sulfide: High concentrations appear to be correlated to increased mercury methylation
- Selenium: Known to be antagonistic to the toxic effects of mercury
- pH: in some instances, the lower the pH of the waterbody, the higher the mercury methylation rate

Additional parameters to consider...

- Temperature: Increased temperatures appear to be correlated to enhanced mercury methylation
- Nutrient concentrations: High concentrations appear to be correlated to increased mercury methylation
- Dissolved oxygen: Low concentrations appear to be correlated to increased mercury methylation
- Proximity to wetlands: Hydric soils seem to be associated with enhanced methylation

The ultimate goal...

- Utah, Nevada and Idaho agreed to come up with a plan for sampling Great Basin lakes and reservoirs
- Use the results to predict which waterbodies will have conditions resulting in high concentrations of methylmercury
- * We may be able to affect change at a local level